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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

LEE, HSIEN MING

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 07/05/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/783,384

Applicant(s)

HUANG ET AL.

Examiner

Scott A Brairton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 February 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                          | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                 | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. | 6) <input type="checkbox"/> Other:  |

## DETAILED ACTION

### *Drawings*

Figure 19b should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### *Claim Objections*

Applicant is advised that should claims 15-18 and 21-25 be found allowable, claims 28-31, 34-36 and 39-40 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 2, 8, 9, 16, 17, 19, 29, 30 and 32, rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "measurable amount" in claims 1, 2, 8, 9, 16, 17, 19, 29, 30 and 32 is a relative term which renders the claim indefinite. The term

"measurable amount" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in combination with Jin (U.S. Patent No. 6,194,309) and Dass et al (U.S. Patent No. 6,162,652).

Applicant's Admitted Prior Art (AAPA) discloses in Figures 1a, 1b, 19a-20d and related text method for forming a metal bump on a semiconductor substrate comprising the steps of providing a semiconductor substrate (figure 1b, 10), the semiconductor substrate having been provided in or on the surface thereof with an Aluminum contact pad (figure 1b, 24), the contact pad sitting on an underlying layer of dielectric (figure 1b, 29) and being in electrical contact with at least one point of electrical contact in or on the surface of the substrate (figures 19a-20d); depositing a layer of passivation (figure 1b, 32) over the surface of the layer of dielectric underlying the contact pad, including the surface of the contact pad; patterning and etching the layer of passivation, creating an opening in the layer of passivation having a first diameter, partially exposing the surface of the contact pad over the surface area of the first diameter, the

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first diameter of the opening created in the passivation layer being smaller than a surface area of the contact pad by a measurable amount (figure 1b); sputtering a layer of under bump metallurgy (UBM) (figure 1b, 33) over the surface of the passivation layer; depositing and patterning a layer of photoresist, creating an opening in the photoresist with a slightly larger dimension than said first diameter; electroplating an enhanced UBM layer (figure 1b, 20) after creating the opening in the photoresist layer and prior to electroplating the layer of bump metal; electroplating a layer of bump metal (figure 1b, 35) in the photoresist opening; stripping the layer of photoresist and etching the layer of UBM, using the layer of bump metal as a mask and reflowing the surface of the layer of bump metal, forming the metal bump.

AAPA fails to disclose etching the contact pad using a passivation layer as a mask, partially or completely removing the contact pad and creating an opening in the contact pad having a diameter equal to the first diameter. Jin discloses in figures 1-2C and related text a method of etching the contact pad (figure 2A, 112) using a passivation layer as a mask (figure 2A, 120 and 114), partially or completely removing the contact pad and creating an opening in the contact pad having a diameter equal to the first diameter (figure 2A, A). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Jin with the method of AAPA in order to remove any impurities created through other previous etching processes (col. 4, lines 445-55).

Neither AAPA nor Jin discloses depositing a layer of polyimide over the surface of the layer of passivation. Dass et al discloses in figures 1-18 and related text a method of depositing a layer of polyimide (figure 6, 120) over the surface of the layer of passivation (figure 6, 115), which is then etched and covered with a layer of metal (figures 7 and 8). It would have been

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obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Dass with the combined method of AAPA and Jin in order to protect the underlying passivation layer (col. 5, lines 60+).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A Brairton whose telephone number is (703) 605-4213. The examiner can normally be reached on M-F, 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-4082 for regular communications and (703) 746-4082 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Scott A Brairton  
Examiner  
Art Unit 2823

sab  
June 27, 2002

*A. Ph*  
LONG PHAM  
PRIMARY EXAMINER